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COATED WIRE CLOTH FABRIC

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FIELD OF THE INVENTION

The present invention relates generally to fabrics and, more specifically, to a coated wire cloth fabric and method for using the same in a hat brim capable of being reformed repeatedly.

BACKGROUND OF THE INVENTION

The manufacturing and design industry is always on the lookout for new fabrics to be used in a variety of applications. The hat manufacturing and design industry is one such industry. Hats are made from an unlimited number of different types of fabrics used as cover materials and in many different shapes to suit the wearer's aesthetic sensibilities. Hats are also worn as a head covering to protect the wearer's head, face and eyes against the elements such as sun, wind, rain, etc.

Hats are typically comprised of a shaped crown and a brim at a lower edge of the crown and projecting therefrom. A bill is the projecting front brim of a cap or a visor. The visor may not include the shaped crown but rather just a headpiece for attachment to the projecting front brim. The projecting front brim may be crescent-shaped assuming a generally convex or rounded curvature. The term "hat" as used herein includes conventional hats, as well as caps, and visors and the term "crown" as used herein includes the visor headpiece.

The projecting front brim is typically constructed of at least one top and bottom layer of cover material, which may be of the same or a different material as the crown. The cover material may be selected from a variety of aesthetically appealing materials such as felts, textile fabrics, canvas, straw, leather and synthetics or the like. The at least one top and bottom layers are usually visible. A middle layer includes an inner reinforcing member to impart stiffness to the projecting front brim to maintain the brim in its generally convex projecting condition.

Conventionally, the projecting front brim has been stiffened by the inner reinforcing member either inserted into a pocket in the at least one top and bottom layers or by a stiffening wire at an outer edge of the brim. The inner reinforcing member has conventionally been made of cardboard, sheet metal, sheet cork, foam or other plastic-type materials such as high-density polyethylene (HDPE), with and without a stiffening impregnate.

The wearer may desire changing the shape or form of the brim for increased protection against the elements or simply for aesthetic reasons. For example, folding the brim upward is a common practice. Similarly, changing the shape or form of the brim is usually desired following the inevitable deformation caused by washing of the hat. Similarly, the brim may have to be folded or furled to conveniently carry it in the wearer's pocket, purse, etc. and then unfolded or unfurled to wear. Unfortunately, such brim reformation has not been easily permitted by the conventional inner reinforcing members and has often resulted in permanent distortion of the brim. The hats are often discarded following such attempts at reformation.

There is therefore a need for a novel material that is capable of continuous change of shape in more than one direction without breaking apart. There is also a need for a novel material that is particularly adapted to make a hat brim that is capable of retaining its shape after reformation, and of being reformed repeatedly into new shapes without substantial distortion or breaking the brim structure. There is a still further need for a material that may be used for a hat brim that is substantially stiff yet pliable enough to facilitate folding, or furling, but when unfolded or unfurled, the brim will resume its shape without bearing indications that it has been recently folded or furled. There is an additional need for such a material that may be used for a hat brim that is tactually and visually appealing. There is a still additional need for such a material that can easily be incorporated into the traditional art of clothing and hat construction

and fabrication including the ability to be sewn. There is a further additional need for a material that is substantially washable. The present invention fulfills these needs and provides other related advantages.

SUMMARY OF THE INVENTION

The present invention resides in an improved coated wire cloth fabric and method for using the same to make a hat brim that may be reformed repeatedly. The coated wire cloth fabric comprises, generally, at least one layer of wire cloth and a coating on the at least one layer of wire cloth.

In a preferred form of the invention, the coated wire cloth fabric may be used in a variety of applications including wearing apparel such as a hat. One such application is its use to make a hat brim that can be repeatedly reshaped and reformed.

The coated wire cloth fabric is comprised of the at least one layer of a wire cloth comprised of a mesh of warp and shute wires. The at least one layer of wire cloth may be a welded mesh or a woven mesh. The warp and shute wires lay substantially flat in a welded mesh providing a substantially uniform plane over which the coating may be applied.

The wire cloth is generally commercially available in a wide variety of metals and alloys including brass, copper, Monel®(nickel copper), nickel, and plain, galvanized, and stainless steel or the like. Metals and alloys useful in the wire cloth of this invention are those that are substantially malleable, substantially ductile and provide structural plasticity to the wire cloth. The useful metals and alloys are substantially non-elastic.

The mesh count of the at least one layer of wire cloth is between 2 openings per linear inch and about 6 openings per linear inch preferably 4 openings per linear inch. The wire

diameter of the warp and shute wires is between about .010 inches and about .040 inches, preferably about .025 inches.

The coating includes at least one thermoplastic resin such as ethylene propylene diene monomer (EPDM), polyolefins, polyvinyl chloride (PVC), polyethylene or the like. When hardened to encapsulate the wire cloth, the at least one thermoplastic resin should substantially withstand bending without fracturing. The melting point of the preferred thermoplastic resin is between about 400-500 degrees Fahrenheit, preferably 430-440 degrees Fahrenheit as used in extrusion lamination processes. It is also preferred that the thermoplastic resin be substantially waterproof, non-corrosive, and penetrable by a standard industrial sewing needle if the coated wire cloth fabric is to be sewn. The preferred thermoplastic resin is a medium-density polyethylene. The coating may also incorporate a lubricant and/or a blowing agent.

The coating may be applied over one or both of a top and bottom surface of the at least one layer of wire cloth by processes well known in the plastics arts including by a lamination process, preferably a double pass extrusion lamination process, by a calendaring process, spread coating, or other similar process. The coating provides a substantially smooth hardened finished surface and encapsulates the wire cloth fabric so that it is tactually and visually appealing.

The preferred coated wire cloth fabric is comprised of a welded mesh made from stainless steel with a mesh size of about .25 inches and a wire size of about .025 inches diameter and having a medium-density polyethylene coating over the top and bottom surfaces of the welded mesh. The coated wire cloth fabric may have a total thickness of between about .048 inches and about .090 inches, preferably about .060 inches. This combination is preferred to give the desired properties of being able to be reformed repeatedly and retain the reformed shape.

The coated wire cloth fabric may be used to make a wire frame member as a reinforcing member for the brim of a hat. The reinforcing member may be made in the conventional crescent shape of the brim. The reinforcing member may be disposed in a pocket or otherwise between at least one top and bottom layer of a cover material in the same manner as the conventional inner reinforcing members. The cover material may be selected from an unlimited variety of aesthetically appealing materials such as felts, canvas, etc.

In an alternative embodiment, the reinforcing member for the hat brim comprises a plurality of wires as a wire frame member defining the shape of the brim and having a coating thereon to encapsulate the plurality of wires in a spaced-apart relationship and provide a substantially smooth surface to the reinforcing member. Each of the plurality of wires follow the contours of the brim from an outer edge of the brim to an inner edge of the brim where the brim is connected to a lower edge of the crown or visor. The outermost wire may define the outer edge of the brim.

A method of making a hat brim capable of repeated reshaping and reformation is provided, comprising the steps of providing at least one wire frame member; coating the at least one wire frame member with at least one thermoplastic resin; making the coated wire frame member into a reinforcing member in the shape of the brim; and incorporating the reinforcing member into the brim of the hat. The reinforcing member may be covered by at least one cover material to suit the hat wearer's individual taste. In the case of the at least one wire frame member comprising the coated wire cloth fabric, it may be made into the reinforcing member in the shape of the brim by cutting or other similar processes. The reinforcing member is incorporated into the brim of the hat in the conventional manner.

Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIG. 1 is a perspective view of a coated wire cloth fabric embodying the novel features of the invention, illustrating the use of an exemplary welded wire mesh;

FIG. 2 is an enlarged fragmented top plan view corresponding with the encircled region 2 of FIG. 1, illustrating the welded wire mesh over which a coating has been applied to encapsulate the wire mesh;

FIG. 3 is a sectional view taken generally along the line 3-3 of FIG. 2, illustrating a substantially planar top and bottom surface of the welded wire mesh coating composite material;

FIG. 4 is a top plan view of a reinforcing member for a brim of a hat, illustrating the coated wire cloth fabric of FIGS. 1-3 cut into the crescent shape of the brim to make the reinforcing member;

FIG. 5 is a perspective view of a hat in the shape of a cap with a crown and the brim attached to a lower edge thereof, illustrating the brim with a portion of a top layer of cover material removed to reveal a portion of the reinforcing member of FIG. 4;

FIG. 6 is a sectional view of the brim taken generally along the line 6-6 of FIG. 5, illustrating the reinforcing member disposed between the top layer of the cover material and a bottom layer of cover material;

FIG. 7 is a perspective view of a coated wire cloth fabric, illustrating a woven mesh with a square weave and a smooth/flat top crimp with the coating on the top and bottom surface thereof;

FIG. 8 is a sectional view of the coated wire cloth fabric of FIG. 7 taken generally along the line 8-8 of FIG. 7;

FIG. 9 is a perspective view of a hat similar to FIG. 5, illustrating a portion of the cover material of the brim removed to reveal a portion of a reinforcing member of the alternative embodiment made from a plurality of wires in a frame shaped to define the shape of the brim and disposed therein; and

FIG. 10 is a top plan view of the reinforcing member of FIG. 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in the drawings for purposes of illustration, the present invention is concerned with an improved coated wire cloth fabric, generally designated in the accompanying drawings by the reference number 10. The coated wire cloth fabric comprises, generally, at least one layer of wire cloth 12 and a coating 14 substantially covering the at least one layer of wire cloth 12.

In accordance with the present invention, and as illustrated with respect to a preferred embodiment in FIGS. 1-8, the coated wire cloth fabric 10 may be used in a variety of applications including wearing apparel such as a hat 16. One such application is its use to make a hat brim 18 that may be repeatedly reshaped and reformed.

The at least one layer of wire cloth 12 may be a welded mesh (FIGS. 1-6) or a woven mesh (FIGS. 7-8). In the welded mesh, the warp and shute wires are welded at every intersection by a weld (not shown). The welds assist in keeping the wires substantially straight, uniform and distortion-free. The welds may be made electrically, or by other known welding processes. The

warp and shute wires lay substantially flat in a welded mesh, as shown in FIGS. 2 and 3, advantageously providing a substantially uniform plane over which the coating may be applied.

The woven wire mesh is a mesh of warp and shute wires woven over and under other such wires. The woven mesh is available in a number of weaves and may include crimps, but the weave providing the smoothest surface over which to apply the coating is the plain square weave with a smooth/flat top crimp as shown in FIG. 7. The weave is the pattern in which the warp and shute (fill) wires are interwoven. Crimps are corrugations in the wires to permit locking them in place when perpendicular to each other. Crimps are formed either during the weaving process, or with a crimping machine prior to weaving. Crimps help establish the firmness of the wire cloth.

The wire cloth 12 is generally commercially available in a wide variety of metals and alloys including brass, copper, Monel®(nickel copper), nickel, and plain, galvanized, and stainless steel or the like. Metals and alloys useful in the wire cloth of this invention are those that are substantially malleable, substantially ductile and provide structural plasticity to the wire cloth 12. The useful metals and alloys are substantially non-elastic as the metal/alloy should retain a given shape after the applied load is removed. A malleable metal or alloy can be hammered, pounded or pressed into various shapes without breaking. A ductile metal can be easily molded and pliant; it can be stretch drawn or hammered thin without breaking. Plasticity is the ability to be molded or shaped into various forms that are retained.

The mesh size of the wire cloth 12 is measured by "mesh count." "Mesh count" refers to the number of openings in one lineal inch of the mesh, measured from the center to the center of parallel wires. The preferred mesh count is between 2 openings per linear inch and 6 openings per linear inch, preferably about 4 openings per linear inch. For example, the preferred "4 mesh" means the welded mesh has 4 openings per linear inch, each measuring ¼ inch from center to

center of adjacent parallel wires. This range permits formability and retention of the shape without constant flexing of the wire cloth. Wire size is measured by the wire diameter or gauge. The preferred wire diameter is in the range between about .010 inches and about .040 inches, preferably about .025 inches with the warp and shute wires generally having substantially the same diameter.

The coating 14 (encapsulating material) includes at least one thermoplastic resin such as ethylene propylene diene monomer (EPDM), polyolefins, polyvinyl chloride (PVC), polyethylene or the like. When hardened, the at least one thermoplastic resin should substantially withstand bending without fracturing. The melting point of the preferred thermoplastic resin is between about 400-500 degrees Fahrenheit, preferably 430-440 degrees Fahrenheit as used in extrusion lamination processes. It is also preferred that the thermoplastic resin be substantially waterproof, non-corrosive, and penetrable by a standard industrial sewing needle if the coated wire cloth fabric is to be sewn. The at least one thermoplastic resin is generally commercially available. The preferred thermoplastic resin is a medium-density polyethylene.

The coating 14 may be applied over one or both of a top and bottom surface 20 and 22 of the wire cloth 12, preferably to encapsulate substantially all the wire cloth 12 as shown best in FIGS. 2 and 7. The coating 14 encapsulates the wire mesh and provides a substantially smooth hardened finished surface to the composite fabric material that is tactually and visually appealing.

As is commonly known in the plastics art, the coating may also incorporate a lubricant (not shown) if the fabric is to be sewn and/or a blowing agent (not shown) such as air to decrease the weight of the fabric. The lubricant substantially enables the standard industrial sewing needle to glide in and out of the fabric without pieces of the coating adhering to the needle.

The coating 14 may be applied to the at least one layer of wire cloth 12 by processes well known in the plastics arts including by a lamination process, preferably a double pass extrusion lamination process, by a calendaring process, spread coating, or other similar process.

The preferred coated wire cloth fabric 10 is a welded wire mesh made from stainless steel with a mesh size of about .25 inches and a wire size of about .025 inches thick and having a medium-density polyethylene coating on the top surface 20 thereof and a coating on the bottom surface thereof 22. The coated wire cloth fabric 10 may have a total thickness of between about .048 inches and about .090 inches, preferably about .060 inches. This combination is preferred to give the desired properties of reformability and bendability. After encapsulation, the wires of the mesh preferably cannot be felt (i.e. both top and bottom surfaces are substantially smooth), and are not readily visible if the coating material is opaque.

As shown in FIGS. 4 and 5, the coated wire cloth fabric 10 may be used to make a reinforcing member 24a for the brim 18 of a hat 16. Although the welded wire cloth is shown in the hat of FIG. 5, it is to be understood that the woven mesh can similarly be used to make the reinforcing member used in the brim of a hat. When the coated wire cloth fabric is used in this manner, addition of the lubricant to the coating is desirable so that the reinforcing member 24a can be sewn into the brim of the hat as hereinafter described. Incorporation of the blowing agent is also desirable to keep the weight of the brim relatively low so that it can be part of a hat that is relatively lightweight and comfortable to wear. The weight of the reinforcing member 24a made from the preferred coated wire cloth fabric 10 as described above is between about 23 grams and about 37 grams, preferably 24 grams. The wire cloth is visible through the coating in FIGS. 4 and 5 for clarity, but would not be readily visible if the coating is opaque.

The reinforcing member 24a may be made by cutting or otherwise forming the coated wire cloth fabric 10 into the shape of the brim 18, typically crescent-shaped. The reinforcing member 24a may be inserted between at least one top cover material and at least one bottom cover material 26 and 28 as shown in FIGS. 6 and 8 or in a pocket (not shown) defined in the at least one cover material as with conventional inner reinforcing members. The at least one top and bottom cover materials 26 and 28 may be the same or different. The cover material may be any fabric such as felt, leather, etc. It is of course possible to incorporate the wire cloth 12 without the coating, but the relatively rough finish of the reinforcing member 24a without the coating may not be tactually or visually appealing. The reinforcing member 24a may be sewn between the at least one top and bottom cover material or into a pocket as is well known in the art. The brim 18 may be connected to a crown 30 or visor headpiece (not shown) in the conventional manner.

In an alternative embodiment as shown in FIG. 9, a plurality of wires 32 are made into a reinforcing member 24b defining the shape of the brim 18. Each of the plurality of wires 32 follow the contours of the brim 18 from an outer edge 34 of the brim to an inner edge 36 of the brim where the brim is conventionally connected to a lower edge 38 of the crown. The outermost wire 32a may be welded to each of the plurality of wires at an intersection 40 by a weld (not shown). The welds assist in keeping the wires in the arced condition, and substantially uniform and distortion free. The plurality of wires 32 may be spaced apart from each other at substantially regular intervals from between about 1/8 inches to about one inch, preferably 3/8 inches apart. The coating 14 may substantially encapsulate the plurality of wires in the same manner as the first embodiment. As with the first embodiment, the plurality of wires are visible through the coating in FIGS. 9 and 10, but would not be readily visible if the coating is opaque.

The plurality of wires 32 may be selected from the same metals and alloys as the wire cloth 12 in the first embodiment. The preferred metals/alloys for the plurality of wires 32 of this embodiment are copper and galvanized steel.

A method is provided of making a hat brim 18 capable of repeated reshaping and reformation, comprising the steps of providing at least one wire frame member 12 or 32; coating the at least one wire frame member with at least one thermoplastic resin; making the coated wire fabric member into a reinforcing member 24a or 24b in the shape of the brim; and incorporating the reinforcing member 24a or 24b into the brim of the hat. The reinforcing member 24a or 24b may be covered by at least one cover material to suit the hat wearer's individual taste. The coated wire cloth fabric 10 may be made into the reinforcing member in the shape of the brim by cutting or other similar processes. The reinforcing member is incorporated into the brim of the hat in the conventional manner.

From the foregoing, it is to be appreciated that the coated wire cloth fabric is useful in many applications where there is a need for a fabric that is capable of continuous and permanent change of shape in more than one direction without breaking apart. One such application is its use to make a hat brim that is capable of retaining its shape after reformation, of being reformed repeatedly into new shapes without breaking the brim structure, and which is tactually and visually appealing. The improved brim may be used on any type of hat, including ball caps, visors, and more traditional hats such as cowboy hats, etc.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.